

Personal Rapid Transit

Applicant	Location	Proposal
Jim Burden	City wide	Amend the Mobility & Transportation section to include a presentation of a universal service known as personal rapid transit or PRT.
Recommendation: Denial The PRT concept does not appear to be a feasible addition or replacement for the current transit system or a substitute for the automobile during the course of this Comprehensive Plan.		

Status/Description

Personal rapid transit is a generally unknown and undeveloped subset of a class of transit systems. The PRT term is the most commonly used for a range of concept technologies that are a system of (generally) elevated one-way guideways connecting small stations spaced relatively close together. With the stations placed off of the main guideway, this will allow vehicles to by-pass the stations thus providing a non-stop trip. Current PRT designs envision small vehicles, or "pods", seating 3-6 passengers each, traveling at 25 to 50 mph from any origin station on the system to any other station in the system.

The overhead guideways (or rails) are laid out across an urban area in a grid pattern and since the guideways are elevated, PRT operations would not interfere with street level traffic or require reductions in road lanes or parking. The only street-level space required for the guideway would be room to put a two-foot diameter support pole about every 60 feet. Stations would be very small, with typical stations being only 30 to 50 feet long.

Comprehensive Plan Implications

It is important to point out that none of the PRT technologies are currently operational or ready for deployment. Several urban systems are in the planning stages and receiving attention and others are more or less dormant, without development funding.

The PRT is a public transit system and is not likely to replace the automobile. Even though the PRT system is not expected to offer serious competition for the automobile, it does propose to have service characteristics for some markets that are expected to attract a large number of riders. The service characteristics are such that it may attract significant ridership with in some markets and directly compete with conventional transit systems. PRT studies are taking place in some communities but none replace streets.

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Untried new technology

The PRT system does not fit into the monorail type commuter systems. Several of monorails currently exist in the United States and Europe, but these are largely confined to airports and amusement parks. Two cities, Miami and Detroit have monorail-type automatic downtown people-movers, and Jacksonville is now building one. Japan leads the world in monorail technology and usage with includes eight transit systems and several new hybrids using the first working urban mag-lev system (magnetic levitation, a faster, frictionless monorail variation).

Even with this, these are monorail-type transit systems and do not meet the PRT concept definition provided by the Advanced Transit Association which says the true PRT is to include: 1) small vehicles available for exclusive use by an individual or a small group traveling together, 2) direct origin to destination service, without a necessity to transfer or stop at intervening stations, and 3) service available on demand rather than on fixed schedules.

There are several concept PRT systems in the planning and development stages that are projecting a viable revenue operation. But the PRT concept is currently an untested form of urban travel and is seen as risky technology to be initiating in it's early stages of development.

Projected PRT System Costs

The cost of a PRT system is a very frequent question and one that is very difficult to answer because costs depend so much on the particular characteristics of the application, which are normally unique to each urban area. Generally, the costs of a PRT system is expected to be around \$5 Million per mile (one way) which is based on a combination of actual prototype costs and several comprehensive costing studies.

Shown below are the capital cost and operating expense estimates for a proposed PRT application in Cincinnati. Note that these are costs for a complete, mostly ready-to-go PRT system and is only used here as an example. Only when some are built will more definitive cost information become available.

This cost estimate was developed by members of the Sky Loop Committee in Cincinnati in 2001 which is the most recent and detailed estimate of the cost of a PRT system available. The Sky Loop application is for a 12.84 mile downtown circulator type system. The assumed daily trips were 37,100 and the assumed vehicles per mile was 55. More detail on the proposed PRT network and other attributes can be found at the Sky Loop website.

Proposed Sky Loop PRT Cincinnati, Ohio (12.84 miles)

<u>Capital Costs</u>		<u>Annual Operating Costs</u>	
Total Capital Costs	\$70,080,898	Total Annual Operating Costs	\$ 8,927,723
Capital Costs per mile	\$ 5,458,013	<u>Annual Debt Service</u>	<u>\$ 1,360,788</u>

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Total Annual Costs	\$10,288,511
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Conclusion

The PRT concept does not appear to be a feasible addition or replacement for the current transit system or a substitute for the automobile during course of this Comprehensive Plan. Before the PRT system for the Lincoln Metropolitan Area can be seriously considered for inclusion in the Plan, all the system design details and tradeoffs will need to be calculated. Any development strategy will need to follow formidable planning and evaluation process so that the PRT systems can be compared with other transit systems on the basis of their ability to meet well-defined public goals. Potentially, the PRT concept could be reviewed as part of the upcoming community wide study to develop a Multi-modal Transportation Plan.

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LINCOLN/LANCASTER COUNTY

COMPREHENSIVE PLAN AMENDMENT APPLICATION

The use of this application is appropriate when a change to the adopted Lincoln/Lancaster County Comprehensive Plan is desired. The required questionnaire on the reverse side of this application must be completed as well. The application and required questionnaire are due to the Planning Department no later than 4:30 p.m. on February 21, 2003.

Please print or type.

Date: Feb. 21, 2003

Applicant: Jim Burden

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City: Lincoln State: NE Zip: 68524

Phone: (402) 470-3678 (402) 470-3678

Contact (if not applicant): _____

Mailing Address: _____

City: _____ State: _____ Zip: _____

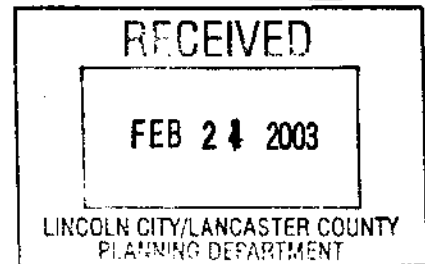
Phone: () _____

If applicable, name of general area/location/site which would be affected by this proposed change
(Attach additional sheets if necessary.).

Personal Rapid Transit applies to Transportation
and environmental sections

Applicant Signature: Jim Burden

Date: Feb. 21, 2003



Numbered questions on the Comprehensive Plan Amendment Application, Required Questionnaire. Nebraska, national and global issues, comparisons and examples are provided for the Lincoln Lancaster county PRT proposal because it is almost impossible to separate transportation systems that would have to be transcontinental and mobility needs that are often trans oceanic.

1. Proposed here is the inclusion in the comprehensive plan of a presentation of a universal service personal rapid transit system, or PRT. This is treated eventually as a full transportation replacement. This could initially be a Lincoln-Omaha area highway and street unloader.

All urban plans start with acceptance of streets as the primary means of mobility around which the other community features revolve. PRT is vastly superior to the use of private autos, trucks and aircraft while eliminating a need for parked vehicles that may make profits for many businesses but boost the cost of transportation by at least a 5% to 10% share of Nebraska's economy.

PRT is available immediately on demand, requiring no land area for stations if the vehicles are self lowering. They can load on any flat area under the guideway for freight and passenger service. Combined with full automation to eliminate the 60% to 80% typical labor share of all hired transportation, PRT costs less per ton mile or seat mile than any other form of general purpose transportation.

Unlike all other forms of transportation that have idle periods underway PRT is nonstop in route. PRT is not likely to be commonly rejected by most potential users as all mass transit systems are because of the well defined features that exceed the utility of private automobiles and aircraft. PRT is about three to five times the speed and direct trip convenience of personal auto and truck use.

After thirty five years of active PRT development it is time one city in the world adopted PRT as the primary transportation mode. Let PRT compete in the market place with the road vehicle interests by treating it as an equal in the research dedicated to it according to the comparative data and observations. This is a request that PRT receive the place it deserves in every global urban and rural area transportation plan.

Lincoln just as well as any other place in the world could become the premiere community example of an urban area without any real need for significant road vehicle use. This would leave the whole of the ground surface for land uses as needs demand, not as they can be fitted into a road grid filed with cars and trucks. It takes fewer than one tiny 150 cubic foot volume PRT vehicle to replace about six automobiles and one semi truck in hauling capacity.

2. None of the goals and mission statements, that require a transportation solution, generally described in the Comprehensive Plan, can be implemented without PRT being the primary means of mobility. PRT of the right combination of features remains the only definable form of ultimately good transportation without any utilitarian flaws.

Without a full grid coverage of PRT service at nearly every property and structure on the properties, the approximately 28% of Lincoln area residents who do not have a personal automobile lack good transportation. PRT is transportation to everywhere all people want to go, as rapidly as possible, at any time, at low cost, in perfect safety. Auto owners also do not have an ultimately safe, convenient, fast, low cost, environmentally neutral transportation. Any detailed objective study would find the ideal achievement only possible with PRT of the highest performance characteristics. The only walkable city possible with modern cosmopolitan culture is a PRT city. The only environmentally neutral rural development is a totally PRT rural development.

PRT should be ideally inside loading or at door loading access at all commercial sites and activity centers, eventually spreading to subscribing residential blocks. Eventually these lines could service all of Nebraska's approximately 8000 urban street miles. The approximately 10,000 miles of highway connections to all

towns in the state would be possible with about 500 to 1000 vehicles per day on any road. A full PRT conversion would be cheaper to build and maintain with the same tonnage of truck traffic and auto trip miles than the current average of Nebraska highways and street systems. This is with a parity in current vehicle operating cost with over 20 billion miles a year. The cost recovery point is about seven years, at about 5¢ per vehicle mile, hauling one passenger in a four to six seat vehicle or 1000 pounds of goods. The example given is a 150 cubic foot, 100 pound per linear foot GVW vehicle. The vehicles have to have less than 13 square feet of frontal area at a coefficient of drag of .06 or lower for the whole averaged area.

This is at about 30% of the cost of Nebraska's current transportation.

This is a saving of about \$3 billion to \$5 billion a year in Nebraska's current \$54 billion economy. This is during an approximately 16 to 17 year debt retirement period for the entire guideway network vehicles and electric support system. PRT pays good interest and profits to the developers but should become a self owned public service chartered industry incrementally over that period. After the debt is retired the cost of transportation drops to about 12% of current costs, counting a little for accumulating maintenance and replacement. All the cost of vehicles and the tripling of electric power production in the state would be taken care of by the share of the approximately \$8 billion we currently spend on all road vehicle use out of Nebraska's \$54 billion gross domestic product. This could be handled for less than about \$1 billion in PRT operating costs and about \$2 billion a year debt retirement. All guideway users would have to invite the guideway service to their neighborhoods to avoid eminent domain and external control of the system. The property owners and users would have to desire to reduce their cost of living and greatly increase their travel speed. For businesses, easier access by customers and faster merchandise availability would be the inducement to request service. Usually items could be received from most wholesalers in the same hour. Neither automobiles or trucks with all the future projected control and communications possibilities of fully automated highways and the radar safety systems and all improvements in running gear and body materials can achieve this possibility a thousand years from now. This was possible with lesser speed and electromechanical interlocking about a hundred years ago. PRT can be proportionally fare supported where ever the user density is high enough, about 500 to 1000 vehicles per day. For lower traffic situations special funding would have to be devised or the user would have to accept the built in higher metered fees for spur guideways. This fee system could be part of every vehicle and guideway section. Revolving funds could be created from general guideway fee revenues to pay for certain lesser used feeder grids. This is little different than gas tax funding of road ways. PRT fees can be incrementally metered for all separated costs accumulated moment by movement and at each section of the guideway. PRT is more equitable because every user pays the exact metered cost of the trips made and no more. There need be no tax support for transportation except for subsidies coaxed out of government to continue to support any repairs on the almost unused parts of the system.

The impact most feared is true; about 0.5% of Nebraskans would lose their business's value because they invested in century old obsolete technologies. Roads development was made acceptable for general use only with government mandated support and suppression of the only known alternative. As many as 80,000 Nebraska jobs might be lost to the guideways but the economic gains should replace them. This transition would happen slowly over about a twenty to thirty year period in which the new found freed up money from transportation savings in the economy would create other jobs even if no PRT production occurred in the state. This potential reality has been the reason special interests have lobbied hard to make sure PRT never even comes up for discussion.

Advanced transportation which can only be PRT is not addressed at all in the comprehensive plan. Improvements in the multi modal transportation infrastructure is supported. This is a single mode replacement for all the obsolete systems except for the less than 1% of net loads that are too large to carry on the guideways. These would have to use the existing roadways or use aircraft transfer.

PRT is excluded from the Lincoln area discussion because dependence on a fixed transit system is believed beneficial only in a dense, high traffic urban area, where congestion and parking make mass transit the allowed contender. Mass and group scheduled transit are not as desirable as personal road vehicles. Transit

development is based on the well described but flawed assumptions of large vehicle efficiencies, themselves based on the assumption that only the existing vehicle forms have any validity.

4. PRT might reduce the transportation cost share carried by the local economy from about 15% to 20% of total domestic product to about 5% in as little as fifteen years. This might be no more than 25 years to nearly total conversion. This would be a gain in the quality of life to Nebraska residents as a whole and rural areas in particular, where the yearly travel mileage per capita is higher and there is a need to get to more sophisticated urban services. These are often over a hundred miles away in the Lincoln and Omaha area.

PRT with the Swedish self hoisting proposal eliminates elevated stations and monorail drop ramps. In this way PRT becomes a totally aerial system taking up no separate right of way land. PRT would use almost no land in that the guideway piers, like street light and utility poles, allow full land uses around them. There are many aerial and buried interference points with guideway installations that might be contentious but all of these have specific technology based solutions.

PRT is not a cooperative multi modal choice intended to complement the other forms of transportation. PRT of the right design is an aggressive competitor for business, not because of promotion or government support, but because a few well thought out engineering decisions can replace millions of repetitive management decisions. PRT eliminates the great labor overhead of all the other systems. Preserving profits and jobs is not good for the community when the cost of those jobs becomes a drag on the whole economy.

PRT is the only form of transportation that can allow green environmentally neutral communities. PRT can side step all utility installations and regular services with automated batch delivery of water, pick up of sewage and garbage, plus retail direct delivery for nearly all goods and services. This changes the make up of neighborhoods which are freed from dependence on central utility grids, and nearby services and local retail. Merchandise could come directly to the home with fully automated delivery.

School children from the earliest ages can use PRT instead of busses. Fire and sheriffs departments, police and ambulance services using dual mode PRT would require fewer people as well as provide for the elimination of traffic patrols. PRT pipe line and commodity trains could deliver more irrigation or fire suppression water to any guideway connection than would be normally piped. PRT water and waste handling systems are portable and can work transcontinentally where they are most needed instead of remaining at partial capacity or as idle investments buried under the ground. PRT can deliver nearly all building materials and special construction equipment to job sites and can remove the rubble. Sources and disposal points can be hundreds of miles away from the residences and industries. The economics are as yet uncertain but initial computations show promise. The same vehicles that haul water could haul coal or grains at lower than the cost of rail service and eventually at lower than the cost of large marine carriers once the sections of the systems used were debt retired.

5. After 23 years of telling people about PRT locally, I have spent only three years in active presentations to a few groups, including three displays and booths at public events and participation in group discussions at political and environmental meetings. The following are some subjective experiences.

Several hundred people have expressed dismay that PRT does not receive any government mention or that they had never before heard of it. When seeing it has long been proposed some people feel there must be something wrong with it, that maybe it is a system that doesn't work. Actually PRT is no more difficult technology than is the internet or many appliances and automated controls which we use every day. The idea that PRT is generally unprofitable in the long term seems to draw recognition as the possible reason why it is not promoted.

A display at the state capital created interest from some viewers but no interest from state legislators. Talks with several transportation planners and executives have resulted in the typical range of opposition and zero support in spite of the potential benefits.

If a PRT initiative could be raised it would be over the opposition of almost every one in public life to whom I have talked. "Even if this was as good as you say, I could not do anything unless there was much support from others," said Doug Bereuter. There has been occasional enthusiasm from midlevel management but little support from their superiors.